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THE SIMPLEX PROJECTOR

Researched by
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It is a little ironic that this the first information sheet published by the Projected Picture Trust should be on the classic American projector the Simplex. Patriots should be comforted however by the fact that the man most directly responsible for the quality of engineering in the Simplex was a Scot, Francis B. Cannock, who had emigrated to America to work for the Singer Sewing Machine Company. Cannock's dictum, on which the success of the Simplex was based, was that "The requirements of the machine fitting placed the thousandth of an inch as the limit of latitude; and on important parts ten-thousandths is the requirement."

In so many ways the Simplex is an adroit first choice since one of its creators was responsible for several major developments in motion pictures. This man was Edward Stanton Porter, best known today perhaps as the creator of film editing with "The Life of an American Fireman" (1902) and for his immensely successful "The Great Train Robbery" (1903) which gave us the screen's first cowboy star, G.M. "Bronco Billy" Anderson. The Simplex can be seen as the most productive branch of the American technology tree. Its own precursors are Cannock's Cinematograph and Edengraph but the Century (Westar), the Motiograph AA and the Ballantyne can be recognized as remote descendants while the Kaplan and the Wenzel mechanisms were direct copies.

The Simplex projector range numbered a great many firsts in projector design among which should be included:

- Synchronous front and rear shutters
- A quickly interchangeable intermittent unit
- Removable film gate
- One shot oiling system
- Spiral bevel gears
- Automatic fire shutter trip mechanism
- Rotating sprocket framing device
- Shutter timing adjustment while machine running
- Shock-proof gears
- Hardened and ground intermittent sprockets
- Adjustable conical pressure pad springs
- Double-bearing intermittent
- Slip-in aperture plate

As can be easily recognized by anyone who has ever worked a Simplex, the basic 1909 design of the projection head changed little over the years — the formula was right. The fire trap gravity rollers; the four-picture upper feed sprocket; the sprung guide rollers immediately before the film enters the gate, eliminating the side play caused by differences in width of early film; the whole gate instantly removable from the mechanism without tools; the intermittent unit, a Maltese cross in an oil bath housing, easily detached complete within three minutes without interfering with the rest of the mechanism, placed very close to the aperture, leading, it was claimed, to particularly steady projection since any shrinkage or alteration in the length of the film would have smallest possible effect; and the four-picture sprocket immediately below the lens. The gate of the projector was opened or closed by means of a spring-assisted assembly operated on a sliding rod. The original hand-cranking arrangement was retained as a facility for many years to enable cold machines to be freed before turning on electric motors. All the

gears of the projector head were totally encased except for the later sound adaption gear at the base of the mechanism. Unlike the Gaumont Chrono, perhaps the most frequently found machine in Britain at the time, the Simplex framing adjustment did not require any re-centering of the arc following a picture "rack." Framing was distinctively achieved on the Simplex by turning the intermittent sprocket on itself. The really unique feature of the early Simplex was that adjustment of the front shutter to correct "travel ghost" was possible while the machine was in motion. The aluminum shutter was adjusted by a racking movement which also moved the intermittent sprocket so that once set correctly it was impossible for "ghosting" to appear on the screen. Early users enthused about the heavy pedestal stand which ensured such rock-steady projection from the quality engineering of the mechanism that by 1914 over 90% of film laboratories were using nothing but Simplex mechanisms. Simplex gears were cut from the solid and the ample shafts running in the cast main frame gave the Simplex an unequalled reputation for rugged precision.

Development on the Simplex was continuous throughout production and tooling from the original Precision Machine Company days was still very much in evidence on the last models of the Super Simplex some forty years later. The following chronology gives the significant dates and details of the development of the Simplex from 1908 to the present day.

Outline Chronology of the Simplex Projector

- 1896: Francis B. Cannock is chief machinist and "operator" at the Vitagraph Works where Mike Berkowitz is engaged as a foot power lathe operator.
- 1896: (April 23) Edwin S. Porter operated the Armat Vitascope at the first New York City screenings of projected motion pictures at Koster and Bial's Music Hall.
- 1896: (June) Cannock is chief operator at the Eden Musee where he is joined by Berkowitz, and the Cinemagraph and Edengraph projectors are designed and built in rapid succession. These projectors were not commercially feasible because of the high manufacturing costs.
- 1898: The Beadnell projector is developed by Edwin S. Porter in partnership with William J. Beadnell, the publicity director of the Eden Musee. (Porter trained Nicholas Power, then an operator at the Novelty Theatre, Brooklyn, to operate this machine.) Manufacture of this machine ceased in 1900 after a fire at the factory.
- 1908: Edwin S. Porter, Francis B. Cannock, and Mike Berkowitz meet regularly designing the first Simplex projector in the back room of O'Keefe's Saloon at 42nd Street and Vanderbilt Avenue in New York City, the first sketches being done on the back of menu cards. Edwin S. Porter provided the money for a small machine shop, the Multi-Speed Shutter Company, to develop the first prototypes. The patents were in Porter's name with a half interest assigned to Cannock. Porter enlisted the financial support of James A. Stillman of the National City Bank who poured in \$80,000 before the first Simplex came off the production line in 1909.
- 1909: Precision Machine Company is founded to manufacture the Simplex and take over the inventions of Francis B. Cannock. Porter was made president of this company. The first models of the production Simplex appeared this year.

- 1910: The first year of full production of the Regular Simplex.
- 1912: (September) Kineto at 80-82 Wardour Street cordially invite British exhibitors to call in and inspect “this Splendid Machine.”
- 1913: (February) Simplex mechanisms installed in London Hippodrome, Standard Electric Theatres, Blue Hall Hammersmith, Rink Kinema, North Finchley, Pyke’s Circuit, B.B. Pictures, Glasgow, North British Film Bureau, Newcastle, Royal Bioscope, Liverpool, Gem Electric Theatre, Bristol, Victoria Hall, York and Lizards, Edinburgh.
- 1913: (March 22 - 29) The Simplex was the most prominent newcomer to the British market at the first International Kinematograph Exhibition held at Olympia.
- 1916: (July 11) The Simplex is patented in New York.
- 1919: Spring arrangement introduced to lens mount enabling it to be pushed forward for speedier threading of film in the gate.
- 1920: The speed control introduced allowing 40 - 140 feet per minute by means of a variable disc clutch arrangement driven by a constant speed driving motor.
- 1925: International Projector Corporation founded, merging Precision Machine Company, Nicholas Power Company, and the Acme Motion Picture Projector Company; all activity being based at 90 Gold Street, New York City.
- 1925: (through 1926) New double-bearing intermittent assembly with rotary oil bath for the Maltese cross introduced.
- 1928: The Super Simplex first introduced in America with shutter removed to the rear of the projector, new design of pad roller arms, a threading lamp, and further enclosure for the entire mechanism.
- 1929: The coming of sound virtually eliminates the Powers projector since both RCA and Western Electric were, in the beginning, made for adaptation to the Simplex projector only. RCA Photophone refused to install sound equipment unless new Simplex projectors were also installed.
- 1930: Rear shutters available in Britain for fitting to existing machines. The leading cinemas of the world’s capitals are equipped with Simplex.
- 1930: (through 1931) Grandeur equipment developed by IPC for “wide-film projection” in America. This was originally intended for 70mm presentation, but was subsequently modified to the SMPE-approved standard of 50mm. The mechanisms were really modified Super Simplex with a film gate slightly curved longitudinally, the convexity facing the lens. There were new design aspects to the Grandeur equipment: The mechanism ran entirely in an oil bath, both 50 and 35mm film could be shown, positive fire prevention devices, and a triple lens turret rotatable with each lens having lateral, horizontal, and vertical adjustment.

- 1932: (through 1933) The Acme-Simplex portable 35mm equipment was introduced to Britain.
- 1933: The Super Simplex introduced to Britain.
- 1936: A new intermittent unit was introduced, and an extra heavy film trap.
- 1937: (April) Simplex E-7 mechanisms installed for trials in Loew's Capitol Theatre, New York City.
- 1938: Full production and introduction of the new E-7 projector in America with its unique shutter arrangement. Front and rear shutters were synchronized on the same shaft. Each shutter acting on a half beam giving a dissolving effect which, it was claimed, produced 12.5% more light, a sharper picture, and less eyestrain for audiences. The E-7 brought in hunting-tooth gearing and one-shot lubrication via an oil reservoir lever. In the E-7, gears revolve on shafts which are stationary and do not revolve on bushings in the main frame — the first major departure in design from the original Simplex model.
- 1940: Front shutters available for modifying British Simplex and Super Simplex mechanisms.
- 1945: (September) Simplex High arc lamp in American production.
- 1946: (January) Simplex plant moves to Broomfield, New Jersey.
- 1948: (August) American introduction of Simplex type SP sound projector.
- 1949: (January) The new X-L Simplex mechanisms installed for trials in the Loew's State Theatre, Broadway.
- 1950: (June) Simplex X-L and Four Star sound system in American production. Super Simplex production began to be run down.
- 1952: Production of E-7 mechanisms began to be run down.
- 1981: The X-L has undergone continuous adaptation and is called a Simplex 35; had a brief spell as a dual 70/35mm machine. In its latest form, the Simplex is still being produced in Paramus, New Jersey by the Simplex Projector Company, New York City, Division of National Screen Service Corporation.

[End of 1981 Manuscript by J. Cannon]

- 1983: Simplex Projector Company purchased by Ballantyne of Omaha, Inc. All Simplex manufacturing relocated to Ballantyne plant in Omaha, Nebraska. Strong International assumes Simplex marketing.
- 1991: Strong International introduces the PR1050E, a Simplex 35 with an automatic lens and aperture changer. The original Simplex 35 is still available as the PR1014. The Simplex 35/70 is supplied with or without the lens/aperture changer. A manual lens/aperture changer is also available, and all models may be ordered with water-cooled film traps. Studio models include the PR1020

(Forward only) and the PR1030 (Forward/Reverse). The Simplex Five Star Soundhead includes a synchronous motor as standard equipment. The Five Star may be ordered with either a standard (mono) or split (stereo) solar cell. The 35/70mm Penthouse includes Teccon Magnetic Heads.

- 1993: The PR1060 replaces the PR1050E and features a TU2020 lens turret which rotates in place, without an open/close cycle to clear the film gate. An optional TU2030 three-lens turret is offered. The electro-mechanical turret control chassis is replaced with a head-mounted solid state control unit.
- 1995: Simplex remains the most popular cinema projector in the world with nearly 1,200 units shipped in 1995. The Five Star soundhead adopts reverse-scanning optics employing a long-life infrared L.E.D. in place of an incandescent exciter lamp. An enclosed signal pick-up assembly improves channel separation. Digital “adaptable” and digital “ready” configurations allow easy interfacing to the most advanced sound processing gear.
- 1997: A visible red L.E.D. replaces the infrared L.E.D. in reverse-scanning Five Star soundhead in preparation for the industry’s adopting a cyan dye soundtrack. The quartz exciter lamp used for digital scanning is replaced with a second visible red L.E.D.
- 1997: In the first major departure from the Simplex X-L design, Strong International introduces the PR2000 *Millennium* projector. The traditional Simplex film gate, with integral intermittent shoes, is replaced with a Century-inspired gate and separate intermittent shoe assembly. This permits operators to adjust film tension at the gate to minimize “weave” and insure good focus, while making a separate adjustment at the intermittent shoes to eliminate “jump.” Allowing two separate adjustments minimizes overall film tension, thus reducing transport noise and prolonging print life. The incandescent framing light bulb is replaced with a long-life L.E.D. DC motors and a DC solenoid replace the AC motors and solenoid on the lens turret and aperture changer to simplify the control circuitry and contribute to longer component life.